

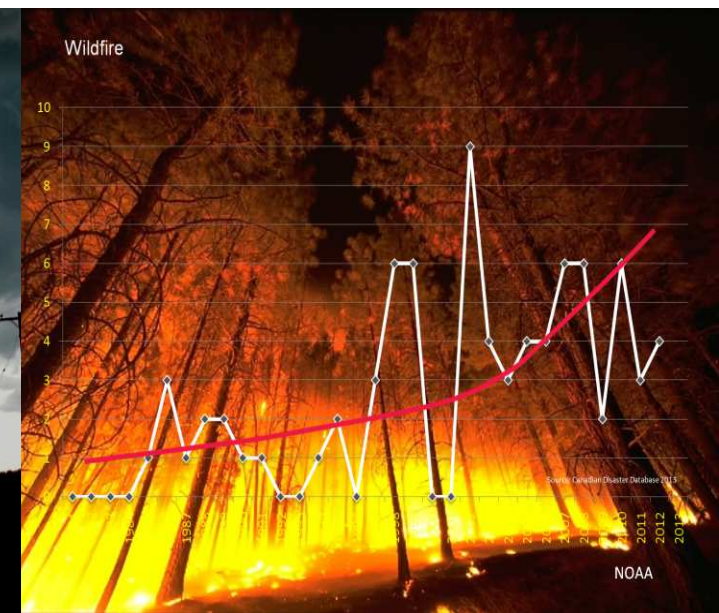
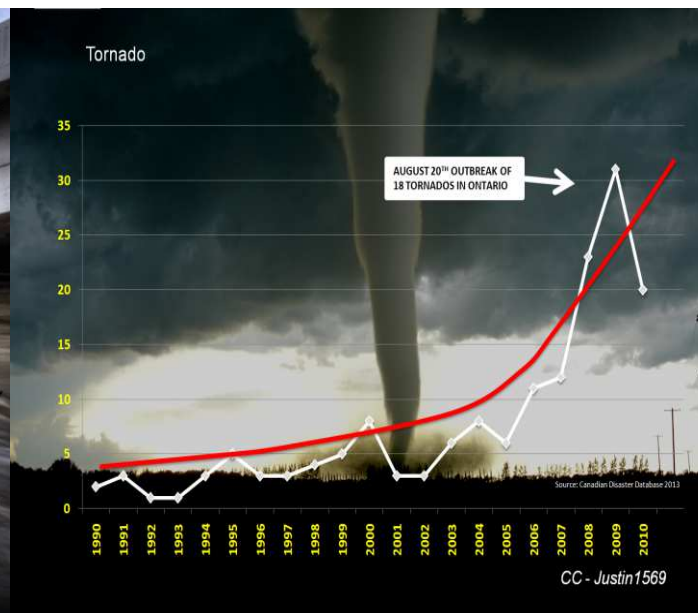
Climate, Resilience & Infrastructure

Auditing Association of Canada Conference
Toronto, 8 May 2017

A.H.Hay CEng PEng FICE FInstRE CRM



Southern Harbour



Our world is changing



Principal fiduciary responsibility

Consequence is reasonably foreseeable

Confidence defines access to debt



‘It is that essential ability of an operation to respond to and absorb the effects of shocks and stresses and to **recover** as rapidly as possible normal capacity and efficiency.’

Operational Resilience

University of Toronto Centre for Resilience of Critical Infrastructure

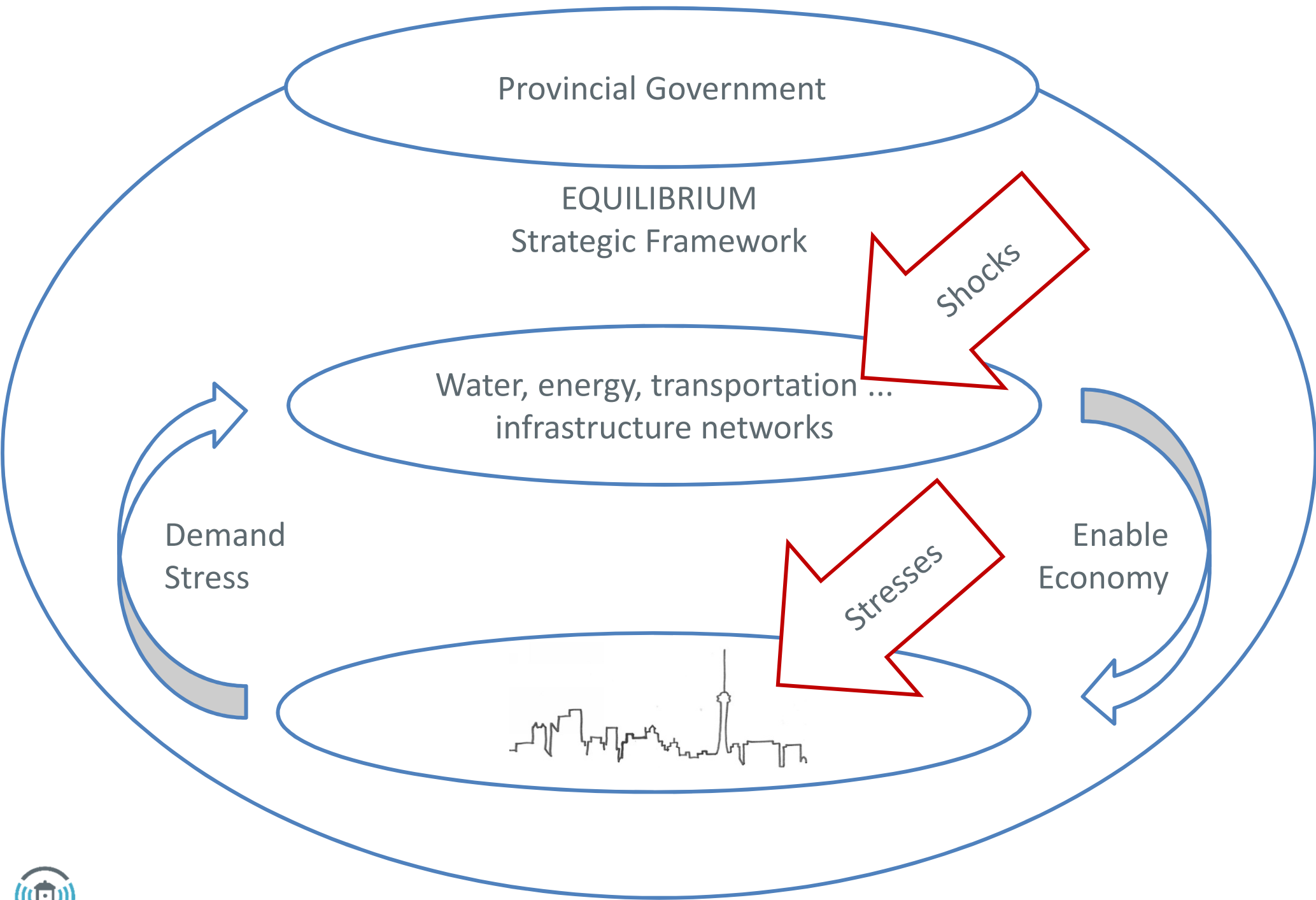
crci |



Community
Resilience

Operational
Resilience





Provincial Government

EQUILIBRIUM
Strategic Framework

Water, energy, transportation ...
infrastructure networks

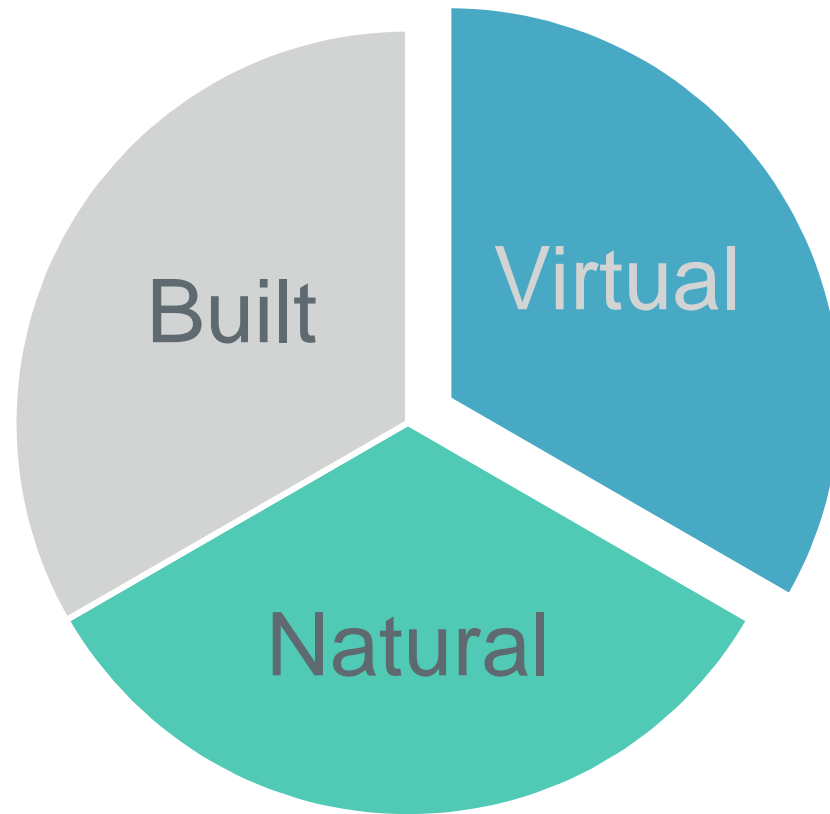
Shocks

Demand
Stress

Stresses

Enable
Economy



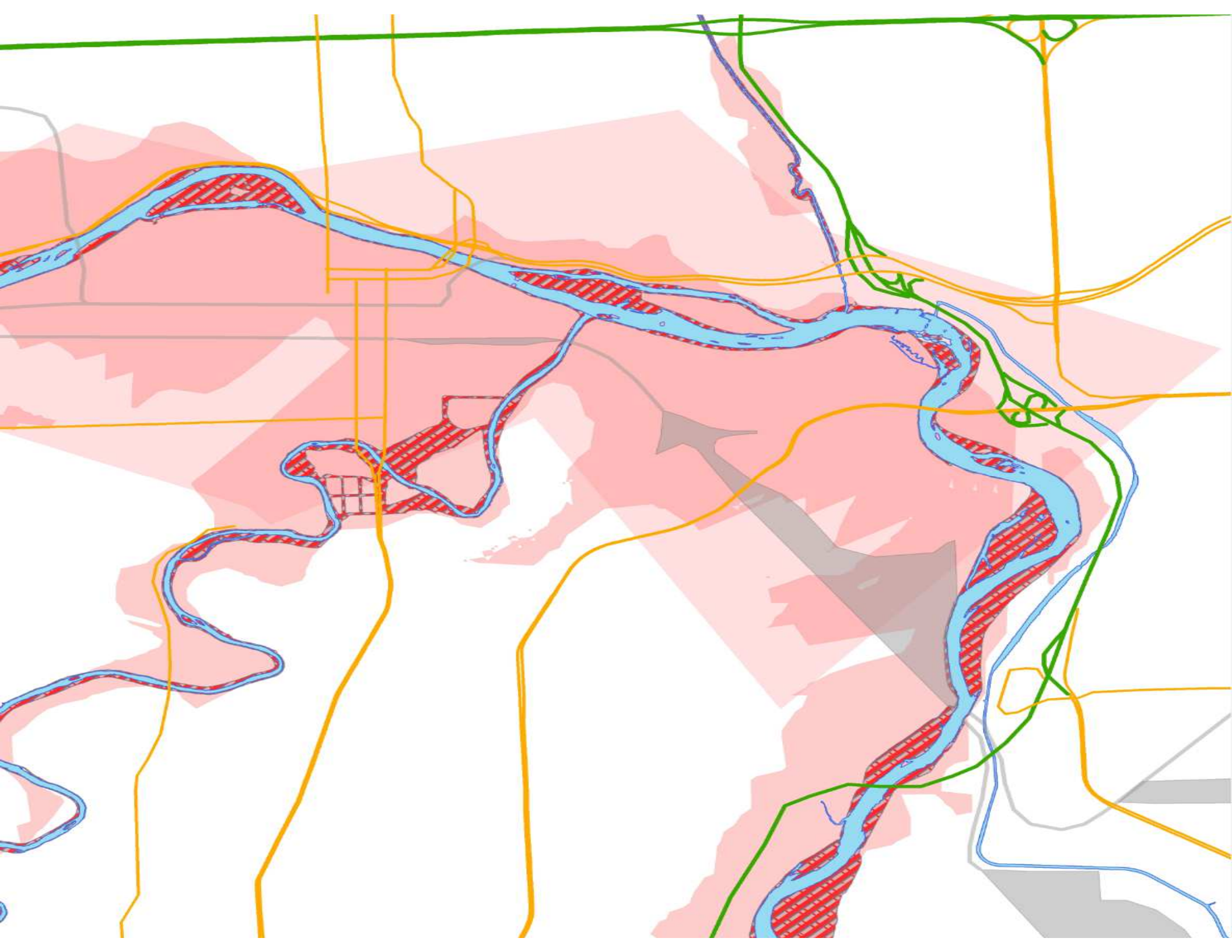


Synergy ↑, Cost ↓

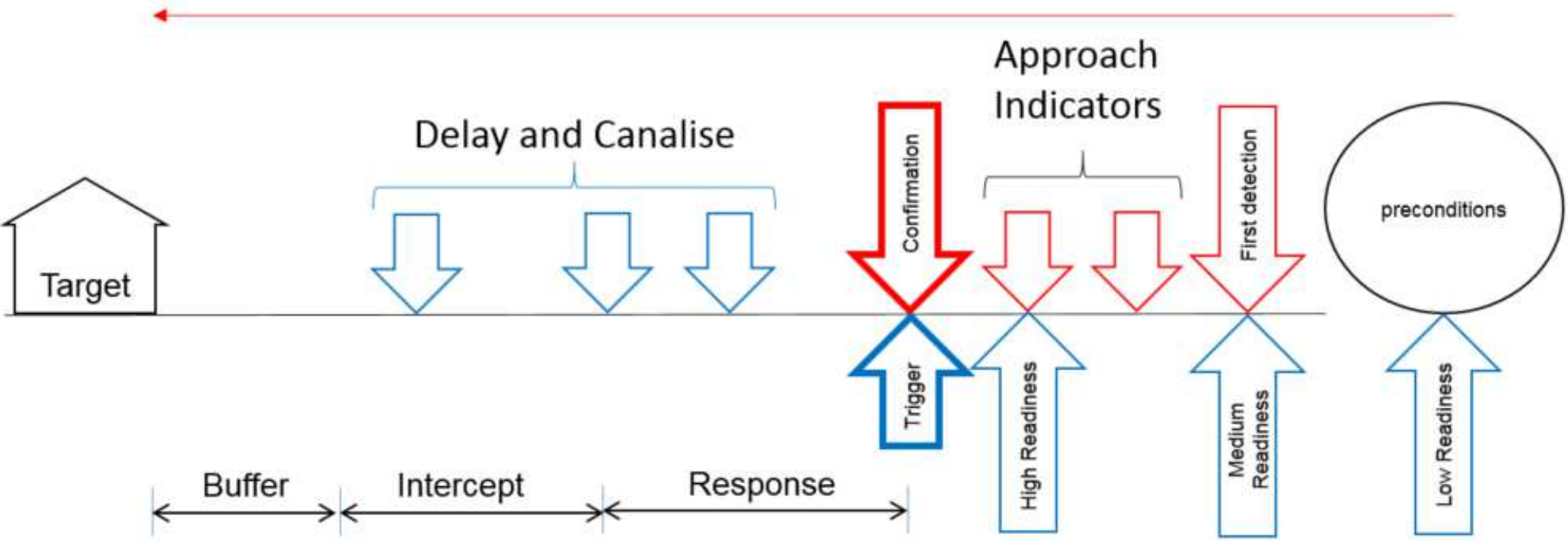


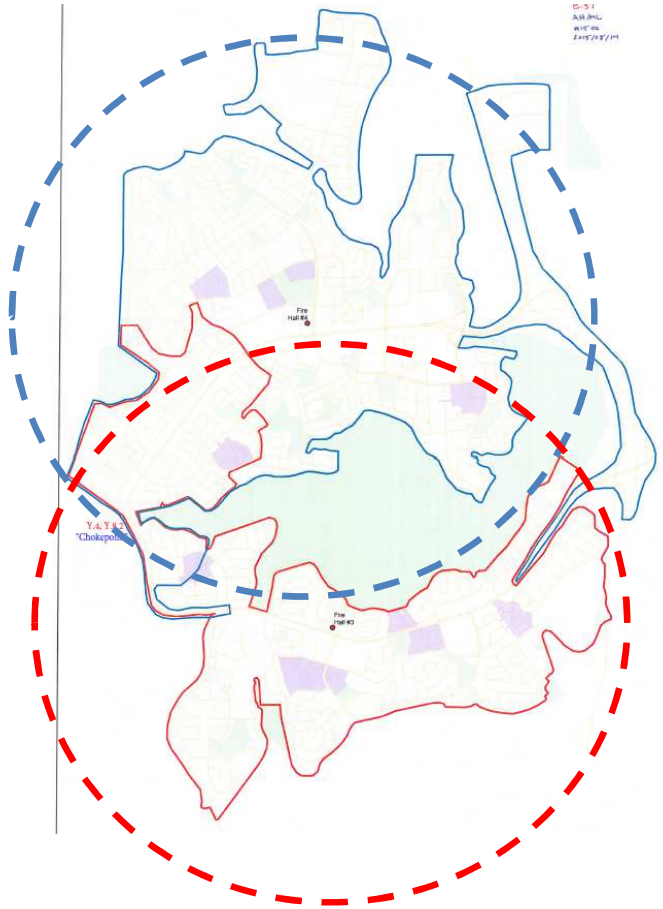
Consequence is
reasonably foreseeable





Hazard Travel Line





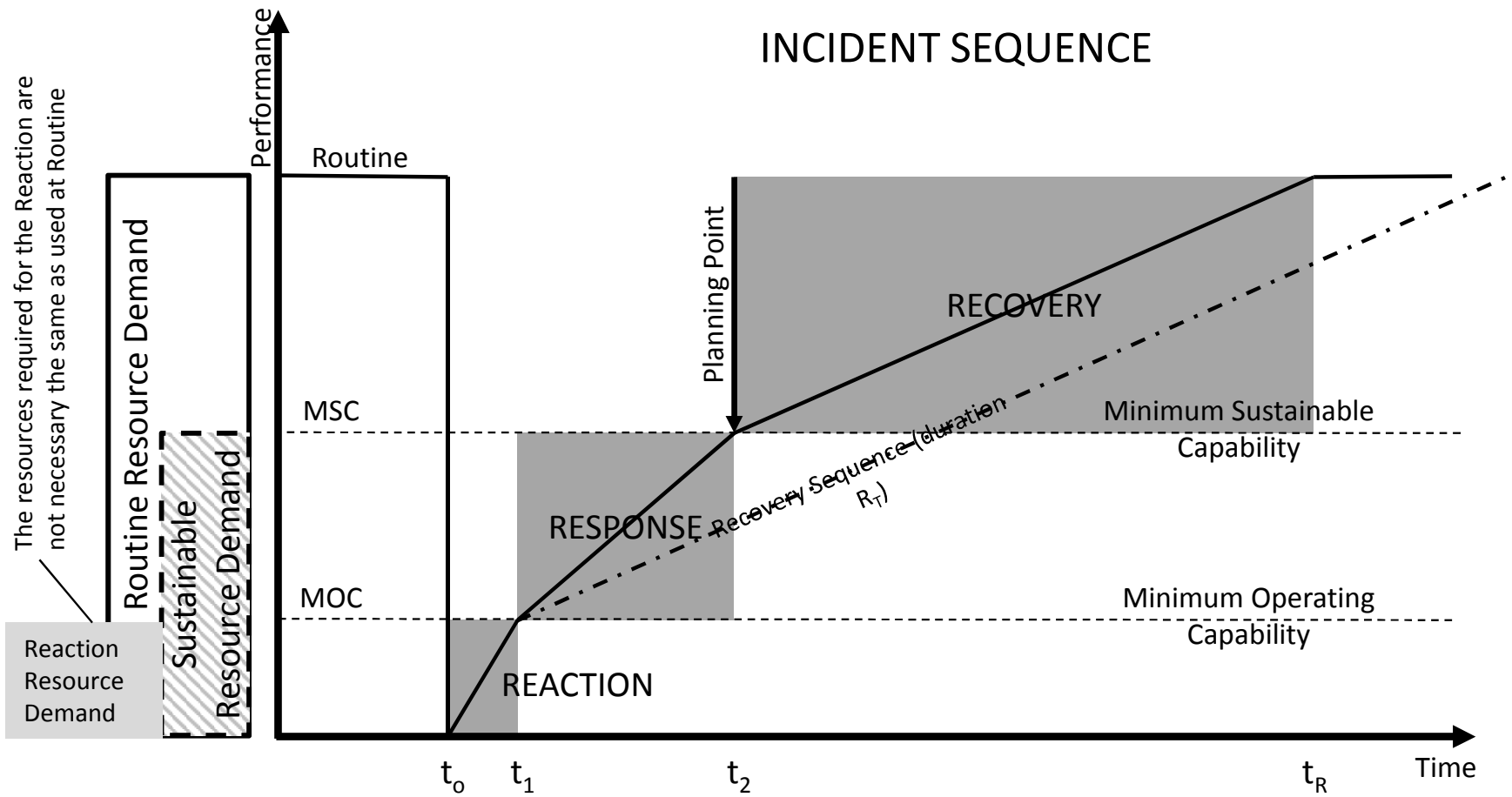
Understand the Business

Verify the Assumptions



Purpose *before* Infrastructure





The resources required for the Reaction are not necessary the same as used at Routine

Reaction Resource Demand

Routine Resource Demand

Sustainable Resource Demand

INCIDENT SEQUENCE

Performance

Routine

MSC

MOC

Planning Point

RECOVERY

RESPONSE

REACTION

Recovery Sequence (duration R_T)

Minimum Sustainable Capability

Minimum Operating Capability

t_0

t_1

t_2

t_R

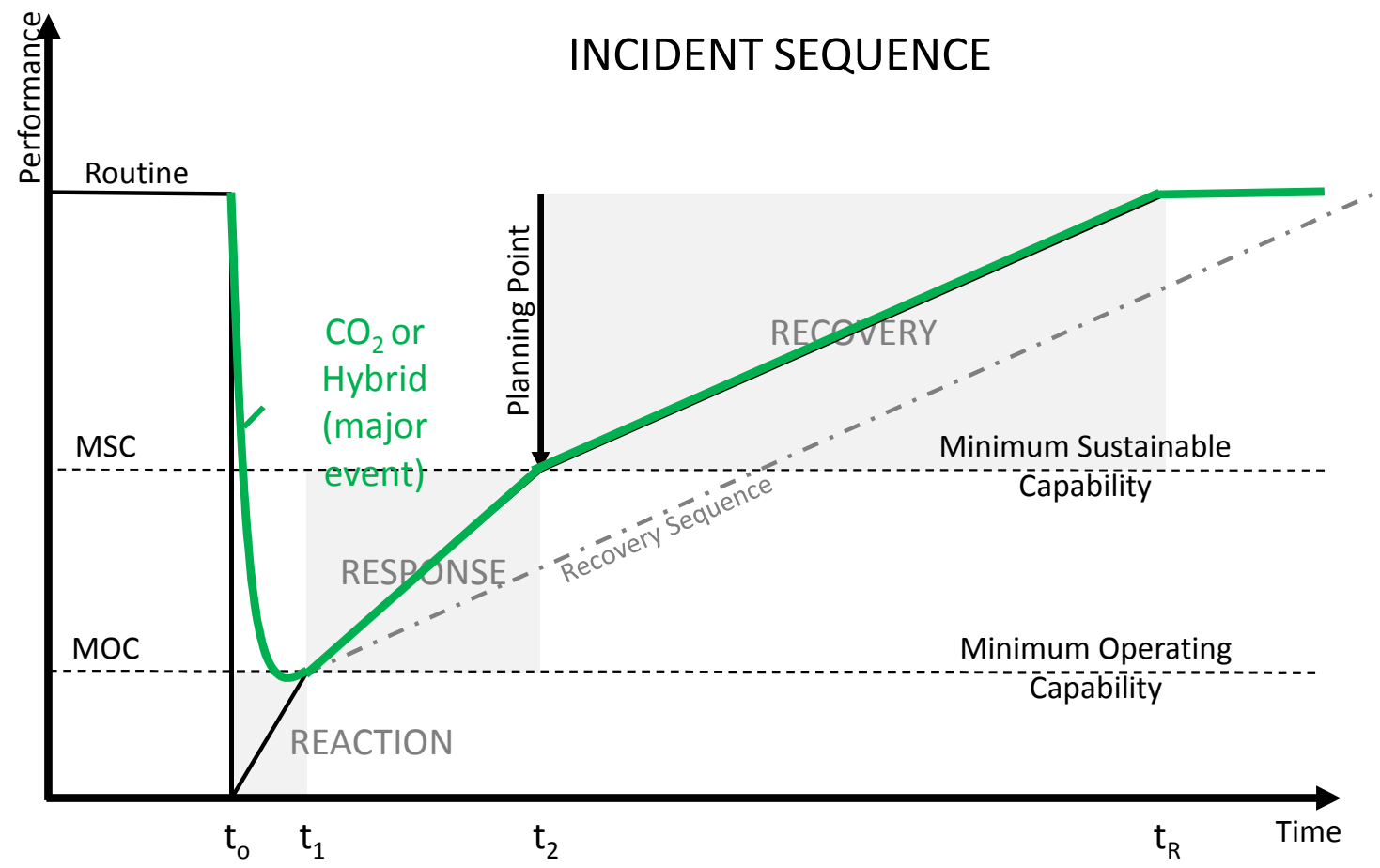
Time



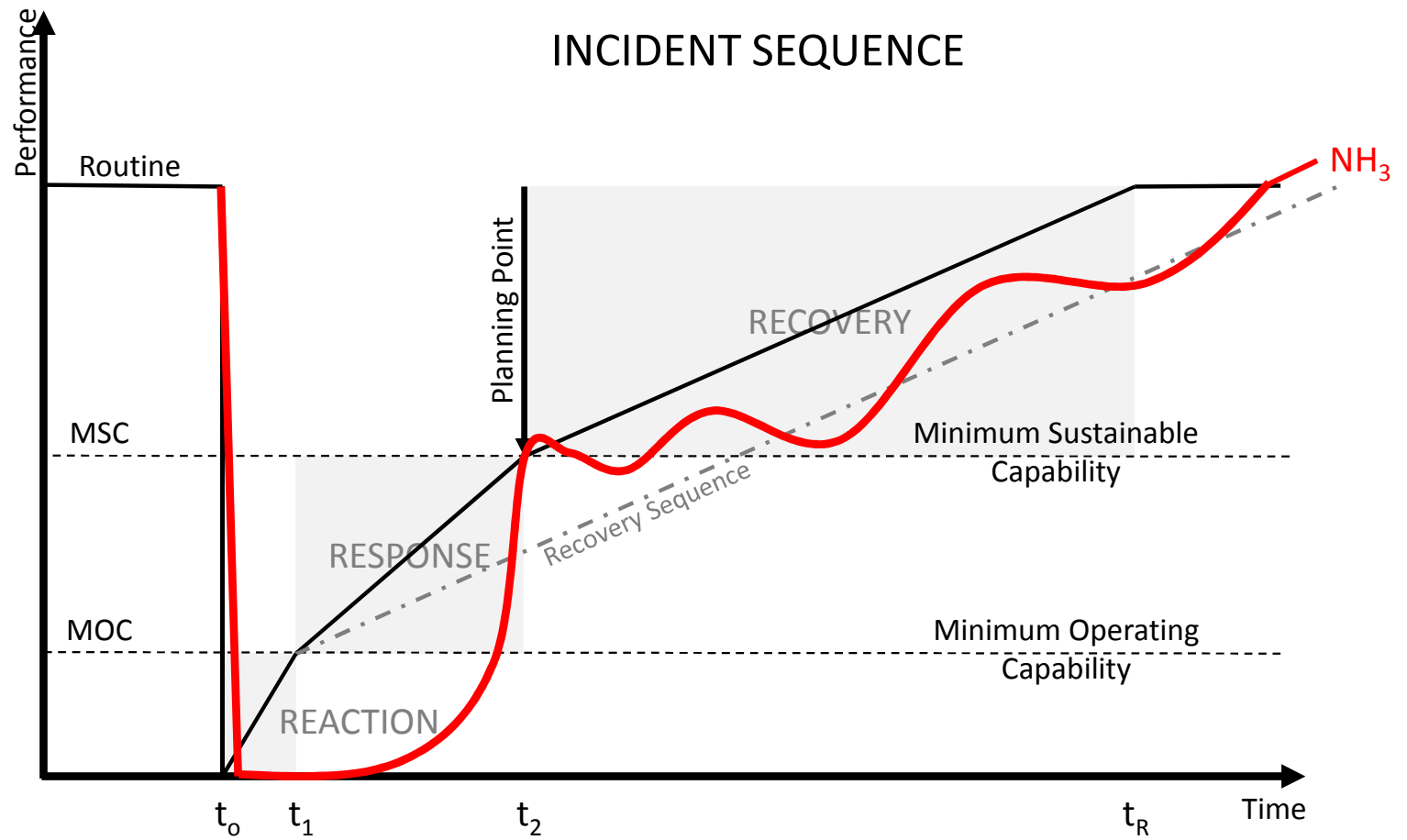
Major Dairy Operation
>10,000 lbs NH₃ refrigeration



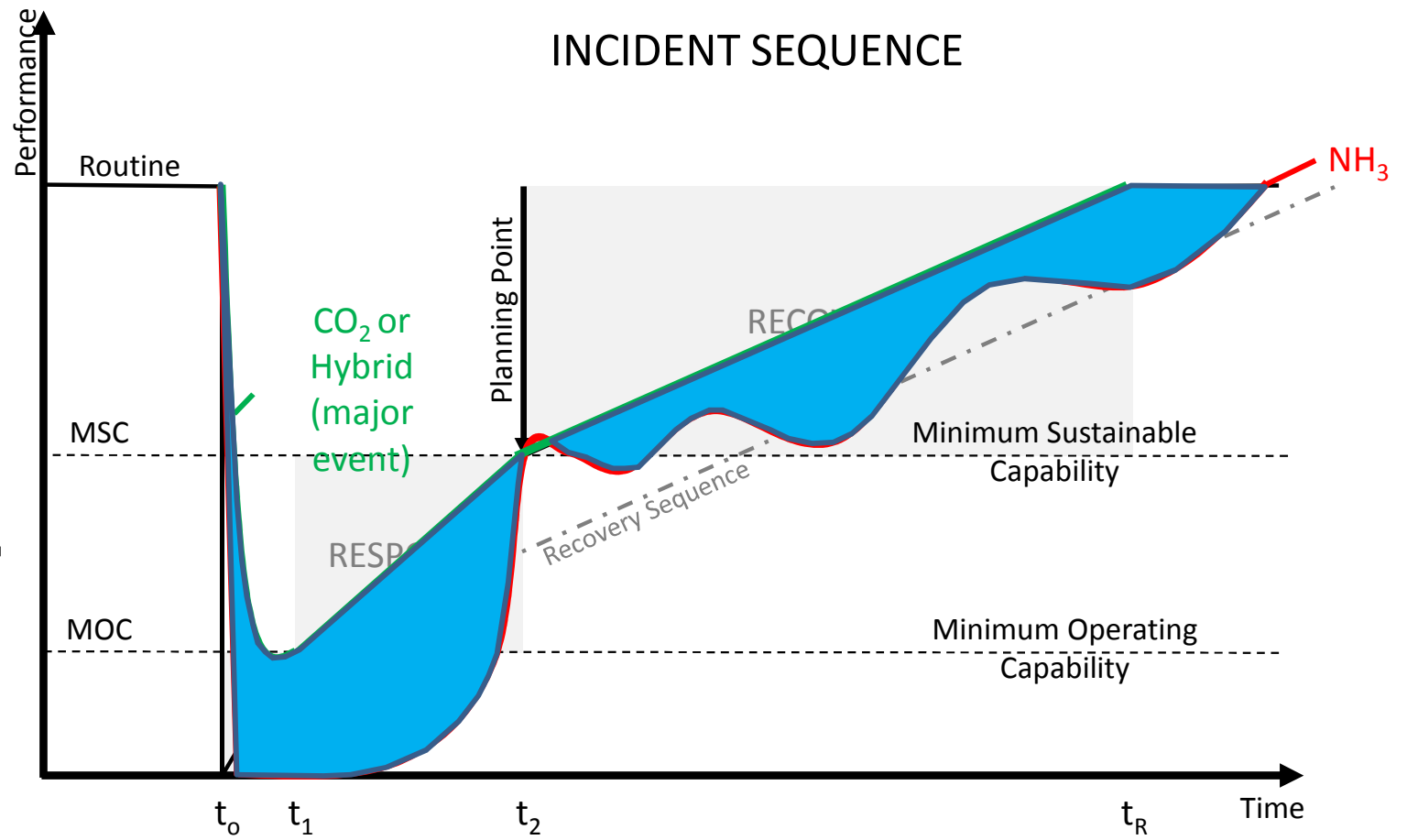
Performance-Time profile of the Operation as a whole (the business) due to a failure of the refrigeration system – CO₂



Performance-Time profile of the Operation as a whole (the business) due to a failure of the refrigeration system – NH₃



Performance-Time profile of the Operation as a whole (the business) comparing major failures of the refrigeration system – NH₃ and CO₂



How does it fail ...?

Optimization – access/**egress**

Densification – **carrying capacity**

Operations – **essential functions**



Safe-to-Fail



Operating Efficiencies
Corporate Social Responsibility
Protecting the Business



Do not define the problem by
the tools you have, but
develop tools to address the
problem you identify.





**Southern
Harbour**
FUTURE READY

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